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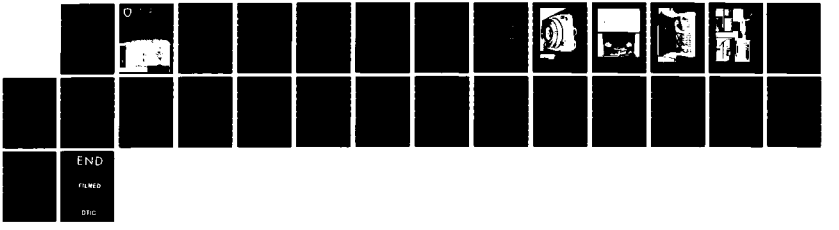

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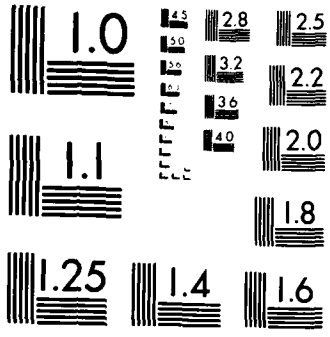

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Technical Note

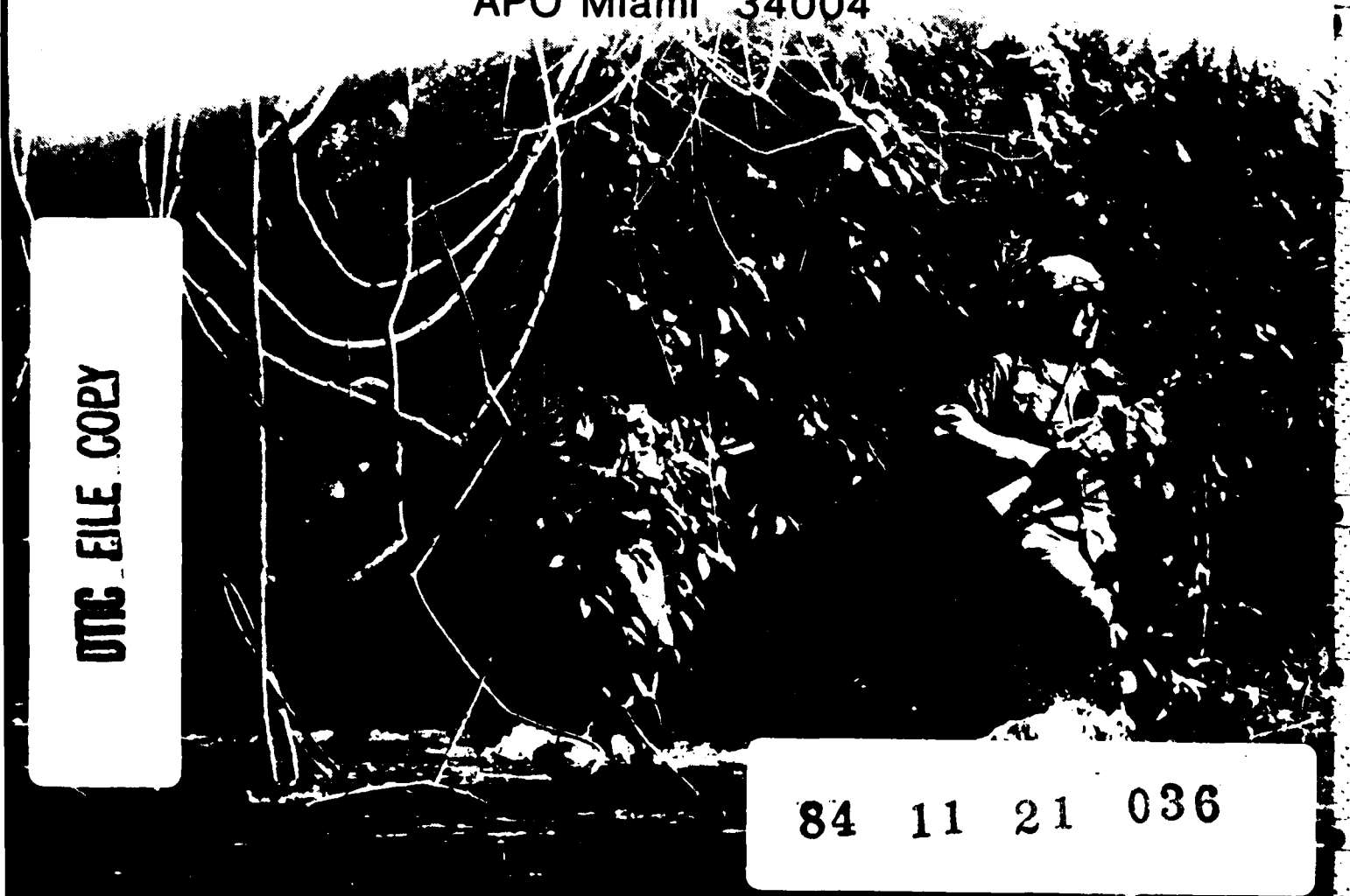
An Automated Questionnaire Administration and Analysis System (AQAAS)

Maxwell C. Elliott

Lloyd S. Hay

OCTOBER 1984

UNITED STATES ARMY TROPIC TEST CENTER
APO Miami 34004



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Questionnaires	Data	
Real time	Reduction	

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

This technical note explains an automated questionnaire administration technique that was developed to reduce questionnaire administration time and data reduction time and errors, and to increase the amount of useful information obtained from subjective questioning. The technique significantly reduced the number of man-hours required to administer questionnaires and the number and types of errors incurred during administration and analyses. Instant, real-time response analyses allowed administrators to identify questionnaire

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items that needed deeper discussion and to ask respondents to elaborate as a group, when necessary.

INTRODUCTION

This technical note explains an automated questionnaire administration technique that was developed to reduce questionnaire administration time and data reduction time and errors, and to increase the amount of useful information obtained from subjective questioning. The technique significantly reduced the number of man-hours required to administer questionnaires and the number and types of errors incurred during administration and analyses. Instant, real-time response analyses allowed administrators to identify questionnaire items that needed deeper discussion and to ask respondents to elaborate as a group, when necessary.

METHOD

The Automated Questionnaire Administration and Analysis System (AQAAS) was constructed using on-hand, surplus equipment and a minimum of custom-built equipment. A schematic of the system is presented in figure 1. The questionnaire items were prepared on slides which were projected onto a screen by a Kodak Carousel slide projector, model 41010. The AQAAS operator advanced the slide projector using a push-button (figure 2).

Each test participant recorded his ratings by setting a multi-position switch on an individual response indicator box and then pushing a "load button" to send his response to the computer (figure 3). The boxes were custom-built in-house. Each switch position (Off, 1, 2, 3, 4, 5, 6) corresponded to a unique fixed value electric resistance (respectively 0, 1, 2, 3, 4, 5, and 6 KΩ). The load switch activated a light emitting diode (LED) on the individual response box. The LED could be observed by the AQAAS operator. The operator could reset the load lights by pressing a switch on the master control box (figure 4).

When all the load indicating LEDs were lit, the operator started the analysis program (Appendix A). A Hewlett Packard (HP) 9830A desk-top computer directed a scan-read using an HP 5300B digital multimeter coupled with an HP 3495A 40-channel scanner (figure 5). The selected resistance values were read and stored, and a statistical analysis subroutine (derived from the HP Calculator 9830A Math Pac Manual, Volume 1, Basic Statistics, Histogram) was printed out (figure 6). Then, the operator advanced the slide tray to the next questionnaire item, and the entire sequence was repeated.

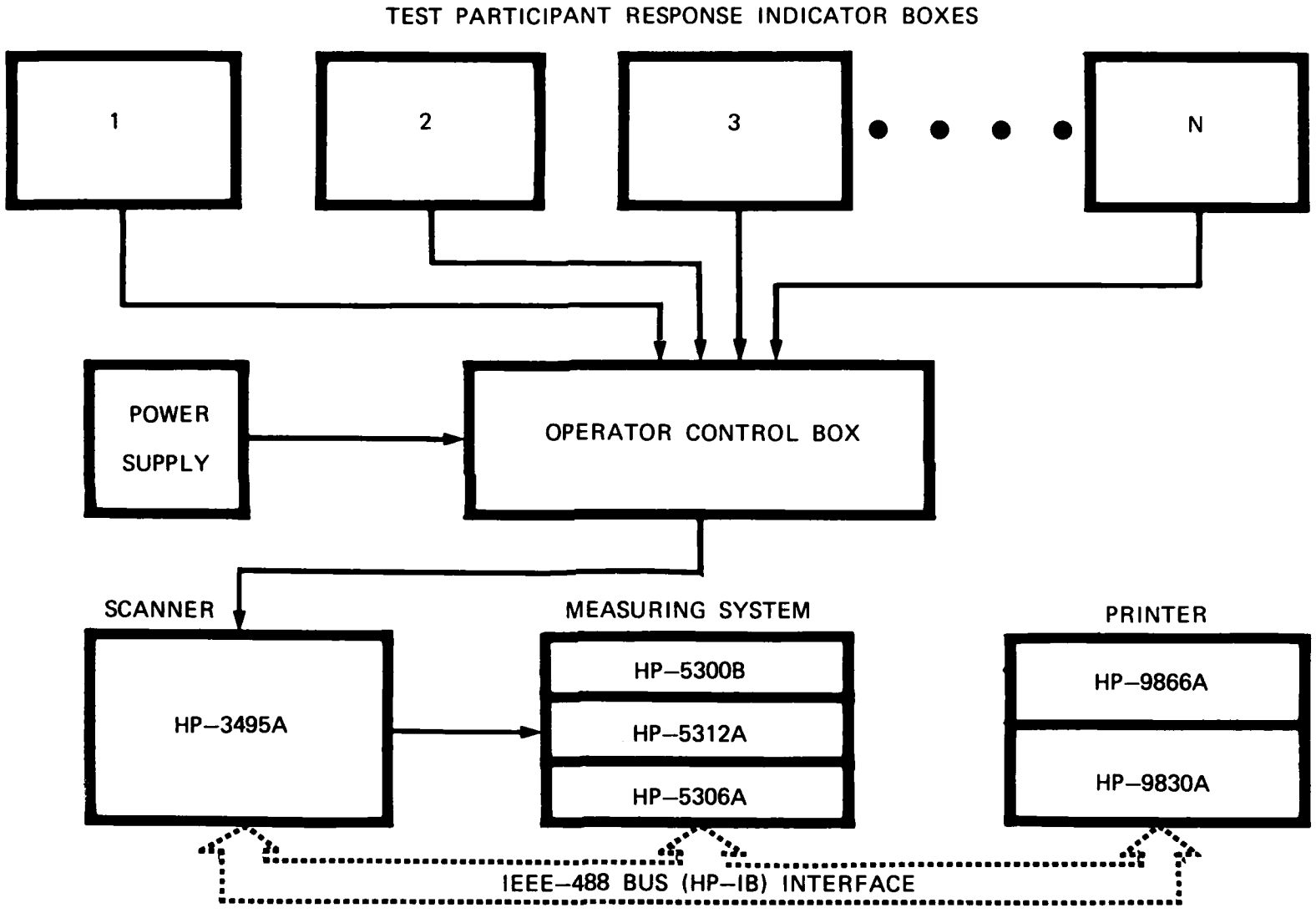

Figure 1. Schematic of AQAAS.

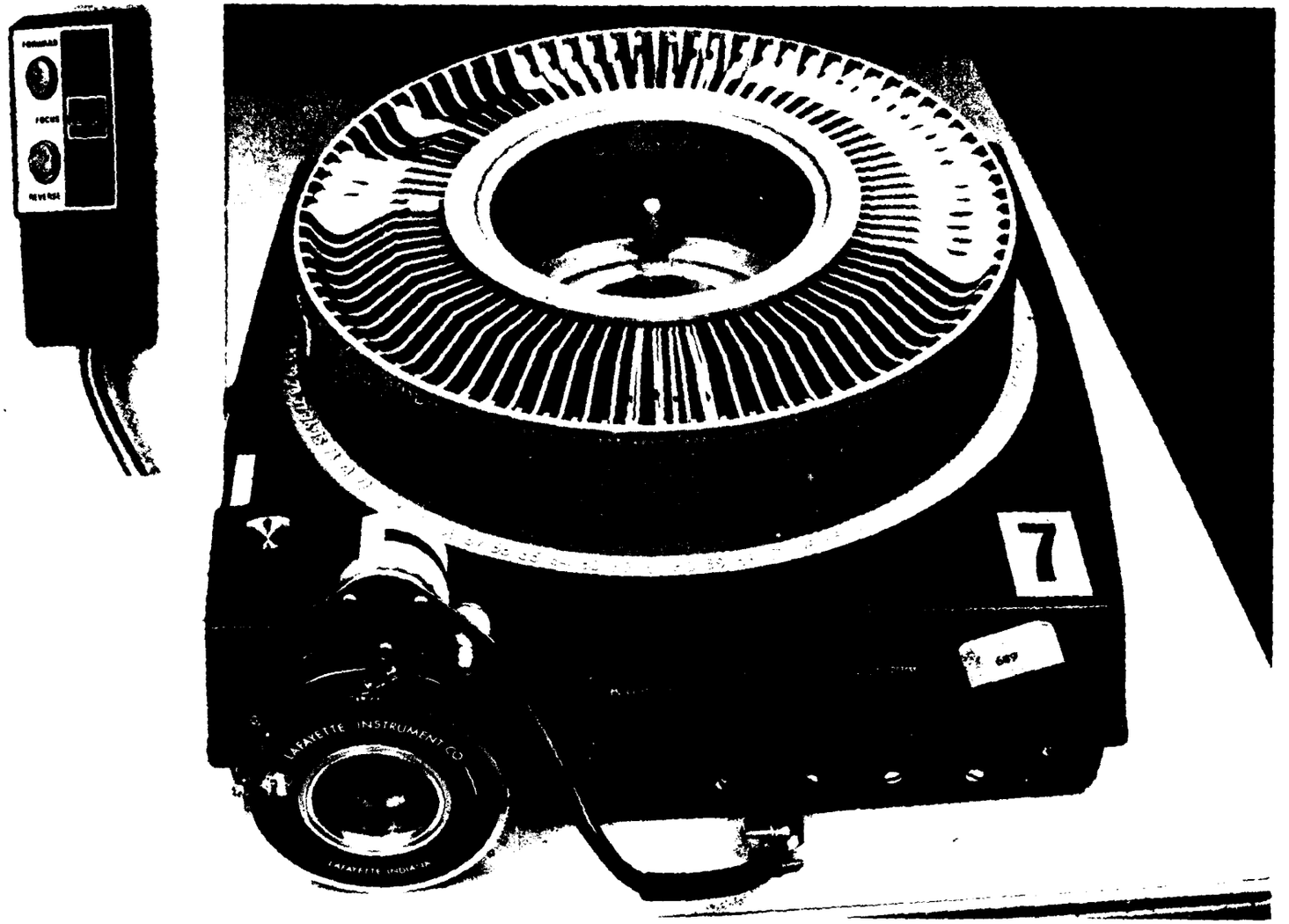

Figure 2. Slide Projector and Advance Switch.

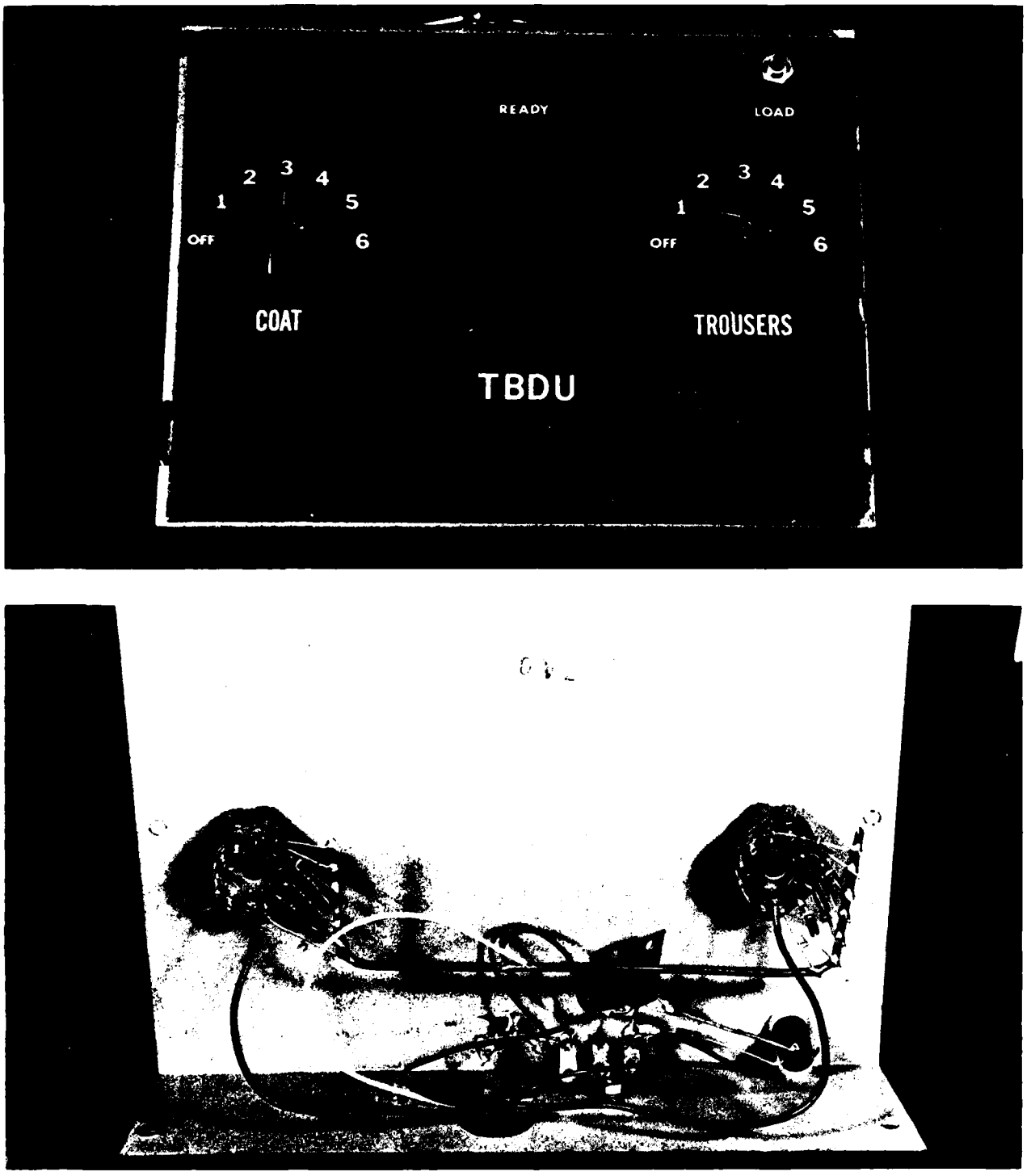

Figure 3. Individual Response Box.

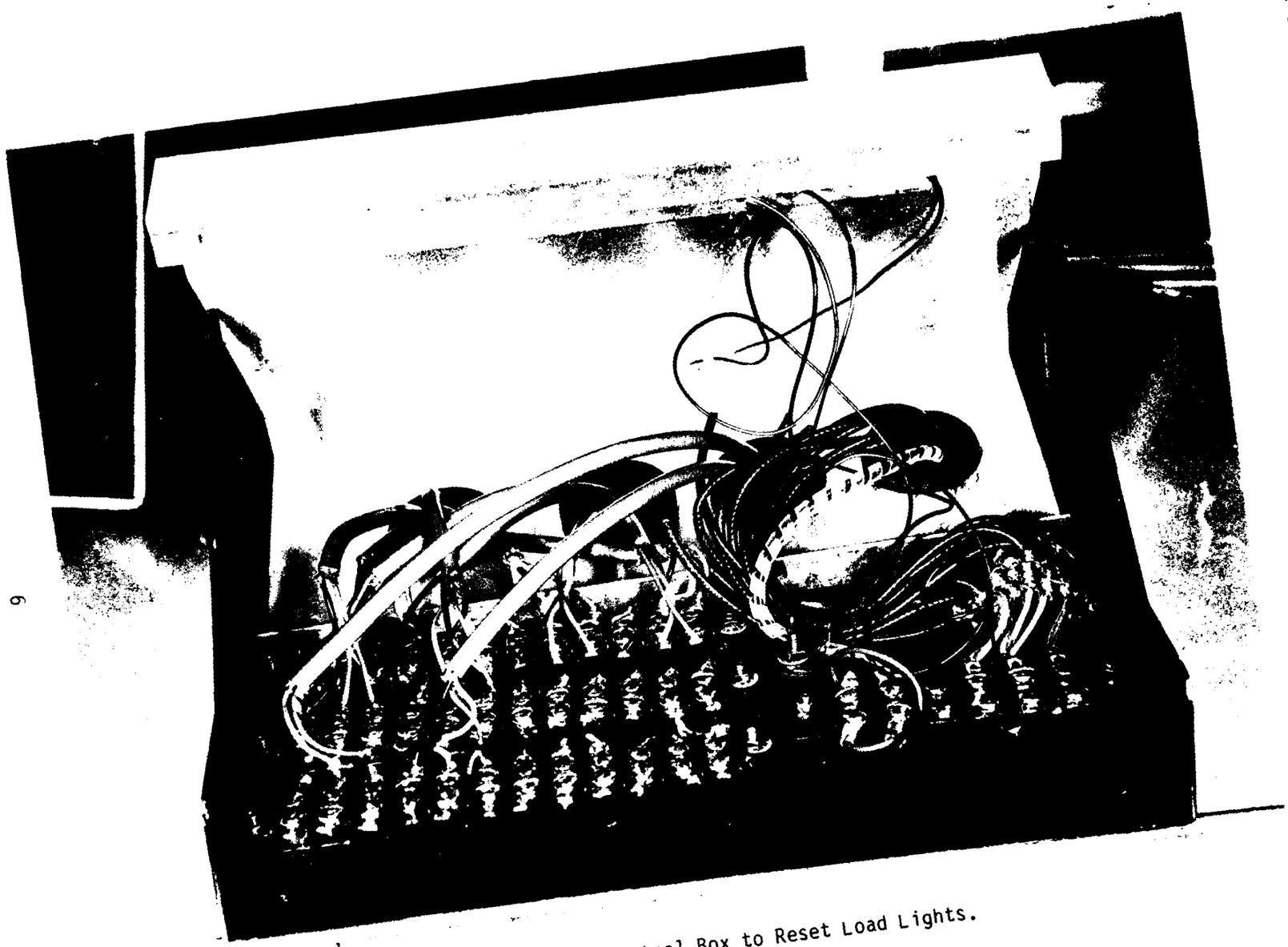

Figure 4. Master Control Box to Reset Load Lights.

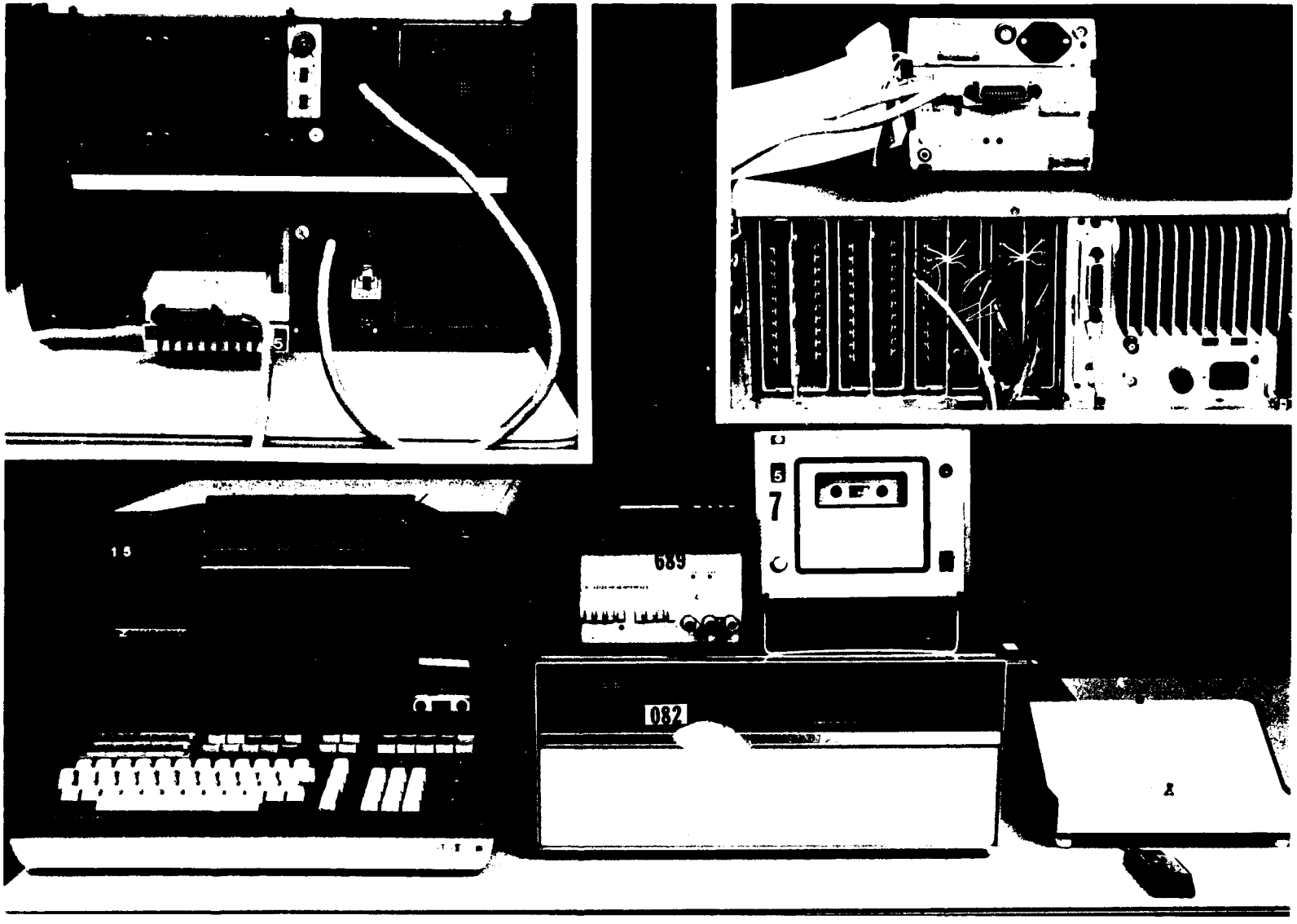

Figure 5. HP 9830A Desk-Top Computer, Directed a Scan-Read Using an HP 5300 Digital Multimeter Coupled with an HP 3495A 40-Channel Scanner.

```
STATISTICAL ANALYSIS
N = 12
MEAN = 3.3333
STD. DEV = 0.9847
SKEWNESS = -1.1442
KURTOSIS = 3.0329
XMIN = 1.0000
XMAX = 4.0000
RANGE = 4.0000

EACH X = 1.46 PERCENT

        0.0000 .*
               .*
        1.0000 .  *
               .XXXX*
        2.0000 .          *
               .XXXXX     *
        3.0000 .                *
               .XXXXXXXXXXXXXXXX        *
        4.0000 .                    *
               .XXXXXXXXXXXXXX*XXXXXXXXXXXXXXXXXXXXXXXX
        5.0000 .       *
```

CELL#	LOWER LIMIT	NO. OF OBS	%RELATIVE FREQ
1	0.0000	0	0.00000
2	1.0000	1	8.33333
3	2.0000	1	8.33333
4	3.0000	3	25.00000
5	4.0000	7	58.33333

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Figure 6. Sample Printout.

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Appendix A (concluded)

```
410 RETURN 0
420 DEF FNC(Y)
440 I=INT((Y-B)/H
460 PRINT TAB(T + 1
480 RETURN 0
```

```
CELL#   LOWER LIM.(   NO. OF OBS  %RELATIVE FREQ
```

```
10 DEF FNC Y)
20 J=50
30 IF A(J)#0 THEN 60
40 J=J-1
50 GOTO 30
70 B=J*H+ B+H/2 - 1
80 RETURN 0
```

```
40 FORMAT 2F5.2
45 PRINT
46 PRINT
50 WRITE (15,40)"EACH X ="W;"  PERCENT"
60 PRINT
70 PRINT
75 Y=FNC(1)
80 FOR I=1 TO B+1
90 Y=Q+(I-1.5)*C
100 FORMAT 2F12.4
110 WRITE (15,100)Y" .";
120 IF P=0 THEN 140
130 Z=FNZ(Y)
140 PRINT
145 IF I=B+1 THEN 190
150 Y=Y+0.5*C
160 PRINT TAB13;".";
170 Z=FNP(Y)
180 NEXT I
190 FOR J=1 TO 3
191 PRINT
192 NEXT J
193 END
200 DEF FNP(Y)
220 T=INT(U*EXP(-((Y-M)/S)↑2/2)+0.5)
230 R=INT((100*A[I]/N)/W)
240 IF T <= R THEN 320
245 IF R=0 THEN 280
250 FOR J=1 TO R
260 PRINT "X";
270 NEXT J
280 IF P=0 THEN 300
285 IF T=0 THEN 296
290 FOR J=R TO T-2+(R#0)
292 PRINT " ";
294 NEXT J
296 PRINT "*";
300 PRINT
310 RETURN 0
320 IF T=0 THEN 345
321 FOR J=1 TO T-(T=R)*P+(P=0)
330 PRINT "X";
340 NEXT J
345 IF P=0 THEN 360
350 PRINT "*";
360 IF T=R THEN 400
370 FOR J=1 TO R-T-1
380 PRINT "X";
390 NEXT J
400 PRINT
```

```
2980 CMD "?U)","31E"
2990 WAIT 500
3000 GOSUB 3050
3001 CMD "?U)","33E"
3003 GOSUB 3050
3010 PRINT
3020 PRINT
3030 DISP "PRESS F5 KEY";
3040 STOP
3050 CMD "?U)!","I"
3060 FORMAT B
3070 OUTPUT (13,3060)768;
3080 CMD "?A5"
3090 FORMAT B,3X,F6.2
3100 ENTER (13,3090)A,X
3110 X=INTX
3120 Z=FNX(1)
3130 CMD "?U) ","CE"
3140 RETURN
3150 Z=FNX(1)
3160 RETURN
3170 END
3202 WAIT 500


10 M=S1/N
20 S=SQR((S2-M*M*N)/(N-1))
30 M3=S3/N-3*M*S2/N+2*M↑3
40 M4=S4/N-4*M*S3/N+6*(M↑2)*S2/N
50 M4=M4-3*M↑4
60 FORMAT F12.4,/,F12.4,/,F12.4,/,F12.4
100 PRINT
110 PRINT "N="N
120 WRITE (15,60)"MEAN="M,"STD.DEV="S,"SKEWNESS="M3/S↑3,"KURTOSIS="M4/S↑4
130 IF T1=0 THEN 150
140 PRINT "MIN,MAX,RANGE MAY BE INCORRECT"
150 WRITE (15,60)"XMIN="R1,"XMAX="R2,"RANGE="R2-R1
160 IF R3=0 THEN 180
170 PRINT "NO. TOO SMALL='R3
180 IF R4=0 THEN 200
190 PRINT "NO. TOO LARGE='R4
200 PRINT
210 PRINT
230 END


10 DEF FNY(X)
11 FOR I=1 TO 50
12 IF R5>A[I] THEN 14
13 R5=A[I]
14 NEXT I
20 W=3.5*R5/N
30 U=(N*C/(2.5066*S))*(40/R5)
```

```
2500 X=U[1,13]
2510 GOSUB 2640
2520 X=U[1,15]
2530 GOSUB 2640
2540 X=U[1,17]
2550 GOSUB 2640
2560 X=U[1,19]
2570 GOSUB 2640
2580 X=U[1,21]
2590 GOSUB 2640
2591 X=U[1,23]
2592 GOSUB 2640
2600 PRINT
2610 PRINT
2620 DISP "PRESS  F5 KEY=";
2630 STOP
2640 Z=FNX(1)
2650 RETURN
2660 PRINT
2670 CMD "?U)","CE"
2680 CMD "?U)","11E"
2690 WAIT 1000
2700 GOSUB 3050
2710 CMD "?U)","13E"
2720 WAIT 500
2730 GOSUB 3050
2740 CMD "?U)","15E"
2750 WAIT 500
2760 GOSUB 3050
2770 CMD "?U)","17E"
2780 WAIT 500
2790 GOSUB 3050
2800 CMD "?U)","19E"
2810 WAIT 500
2820 GOSUB 3050
2830 CMD "?U)","21E"
2840 WAIT 500
2850 GOSUB 3050
2860 CMD "?U)","23E"
2870 WAIT 500
2880 GOSUB 3050
2890 CMD "?U)","25E"
2900 WAIT 500
2910 GOSUB 3050
2920 CMD "?U)","27E"
2930 WAIT 500
2940 GOSUB 3050
2950 CMD "?U)","29E"
2960 WAIT 500
2970 GOSUB 3050
```

```
2020 WAIT 500
2030 GOSUB 2290
2040 U[1,21]=X
2050 CMD "?U)","31E"
2060 WAIT 500
2070 GOSUB 2290
2080 U[1,22]=X
2081 CMD "?U)","32E"
2082 WAIT 500
2083 GOSUB 2290
2084 U[1,23]=X
2085 CMD "?U)","33E"
2086 WAIT 500
2087 GOSUB 2290
2088 U[1,24]=X
2090 CMD "?U)","CE"
2100 PRINT
2110 PRINT "DATA                    COAT                    TROUSER"
2120 PRINT
2130 FOR L=1 TO 12
2131 G=2*L
2132 PRINT "TP"L,TAB24,U[1,G-1],TAB48,U[1,G]
2133 NEXT L
2240 PRINT
2250 PRINT
2252 STORE  DATA H,U
2260 PRINT "STATISTICAL ANALYSIS OF COAT"
2270 PRINT "-----------------------------"
2280 GOTO 2380
2290 CMD "?U)!","I"
2300 FORMAT B
2310 OUTPUT (13,2300)768;
2320 CMD "?A5"
2330 FORMAT B,3X,F6.2
2340 ENTER (13,2330)A,X
2350 X=INTX
2360 CMD "?U)","CE"
2370 RETURN
2380 X=U[1,1]
2390 GOSUB 2640
2400 X=U[1,3]
2410 GOSUB 2640
2420 X=U[1,5]
2430 GOSUB 2640
2440 X=U[1,7]
2450 GOSUB 2640
2460 X=U[1,9]
2470 GOSUB 2640
2480 X=U[1,11]
2490 GOSUB 2640
```

```
1520 U[1,8]=X
1530 CMD "?U)","18E"
1540 WAIT 500
1550 GOSUB 2290
1560 U[1,9]=X
1570 CMD "?U)","19E"
1580 WAIT 500
1590 GOSUB 2290
1600 U[1,10]=X
1610 CMD "?U)","20E"
1620 WAIT 500
1630 GOSUB 2290
1640 U[1,11]=X
1650 CMD "?U)","21E"
1660 WAIT 500
1670 GOSUB 2290
1680 U[1,12]=X
1690 CMD "?U)","22E"
1700 WAIT 500
1710 GOSUB 2290
1720 U[1,13]=X
1730 CMD "?U)","23E"
1740 WAIT 500
1750 GOSUB 2290
1760 U[1,14]=X
1770 CMD "?U)","24E"
1780 WAIT 500
1790 GOSUB 2290
1800 U[1,15]=X
1810 CMD "?U)","25E"
1820 WAIT 500
1830 GOSUB 2290
1840 U[1,16]=X
1850 CMD "?U)","26E"
1860 WAIT 500
1870 GOSUB 2290
1880 U[1,17]=X
1890 CMD "?U)","27E"
1900 WAIT 500
1910 GOSUB 2290
1920 U[1,18]=X
1930 CMD "?U)","28E"
1940 WAIT 500
1950 GOSUB 2290
1960 U[1,19]=X
1970 CMD "?U)","29E"
1980 WAIT 500
1990 GOSUB 2290
2000 U[1,20]=X
2010 CMD "?U)","30E"
```

Appendix A (cont)

```
1050 GOTO 1090
1060 PRINT "034-COMPARE TO STD A FATIGUE, RATE TBDU MAINTAINABILITY FOR SPLIT"
1070 GOTO 1090
1080 PRINT "035-WHEN WEARING TBDU FELL MORE/LESS COMFORT COMPARED TO STD JF"
1090 REM COAT ANALYSIS=1      TROUSER ANA_YSIS=2
1100 DISP "ANALYSIS=";
1110 INPUT F
1120 IF F=1 THEN 1174
1130 IF F=2 THEN 1140
1140 PRINT
1150 PRINT "STATISTICAL ANALYSIS OF TROUSERS"
1160 PRINT "-----------------------------"
1170 GOTO 2660
1174 DISP "FILE#=";
1175 INPUT H
1176 PRINT "DATA STORED IN FILE#"H
1177 PRINT
1180 DISP "PRESS CONT AFTER RESPONSE ";
1190 STOP
1200 CMD "?U)","CE"
1210 CMD "?U)","10E"
1220 WAIT 500
1230 GOSUB 2290
1240 U[1,1]=X
1250 CMD "?U)","11E"
1260 WAIT 500
1270 GOSUB 2290
1280 U[1,2]=X
1290 CMD "?U)","12E"
1300 WAIT 500
1310 GOSUB 2290
1320 U[1,3]=X
1330 CMD "?U)","13E"
1340 WAIT 500
1350 GOSUB 2290
1360 U[1,4]=X
1370 CMD "?U)","14E"
1380 WAIT 500
1390 GOSUB 2290
1400 U[1,5]=X
1410 CMD "?U)","15E"
1420 WAIT 500
1430 GOSUB 2290
1440 U[1,6]=X
1450 CMD "?U)","16E"
1460 WAIT 500
1470 GOSUB 2290
1480 U[1,7]=X
1490 CMD "?U)","17E"
1500 WAIT 500
1510 GOSUB 2290
```

Appendix A (cont)

```
610 GOTO 1090
620 PRINT "Q12-COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR ARM FREEDOM"
630 GOTO 1090
640 PRINT "Q13-COMPARED TO STD FATIGUE,RATE TBDU COMFORT FOR SLEEVE CONSTRICTION"
650 GOTO 1090
660 PRINT "Q14-COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR BREATHING  "
670 GOTO 1090
680 PRINT "Q15-COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR OVERALL FIT"
690 GOTO 1090
700 PRINT "Q16-COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR CUFF SECURITY"
710 GOTO 1090
720 PRINT "Q17-COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR HEAT BUILD-UP"
730 GOTO 1090
740 PRINT "Q18-COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR RUBBING"
750 GOTO 1090
760 PRINT "Q19-COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR CHAFING"
770 GOTO 1090
780 PRINT "Q20-COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR BINDING"
790 GOTO 1090
800 PRINT "Q21-COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR DRYING CAPABILITY"
810 GOTO 1090
820 PRINT "Q22-COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR VENTILATION"
830 GOTO 1090
840 PRINT "Q23-COMPARED TO STD A FATIGUE,RATE TBDU COMPATIBILITY WITH WEB GEAR"
850 GOTO 1090
860 PRINT "Q24-COMPARED TO STD FATIGUE,RATE TBDU COMPATIBILITY WITH UNDERCLOTHES"
870 GOTO 1090
880 PRINT "Q25-COMPARED TO STD FATIGUE,RATE TBDU COMPATIBILITY WITH  C/B GEAR"
890 GOTO 1090
900 PRINT "Q26- TO STD FATIGUE,RATE TBDU COMPATIBILITY WITH INDIVIDUAL WEAPON"
910 GOTO 1090
920 PRINT "Q27- TO STD FATIGUE,RATE TBDU COMPATIBILITY WITH CREW SERVED WEAPON"
930 GOTO 1090
940 PRINT "Q28-STD FATIGUE,RATE TBDU COMPATIBILITY WITH VEHICLE TRANSPORTATION"
950 GOTO 1090
960 PRINT "Q29-COMPARE TO STD A FATIGUE, RATE TBDU MAINTAINABILITY FOR REPAIR"
970 GOTO 1090
980 PRINT "Q30-COMPARE TO STD A FATIGUE, RATE TBDU MAINTAINABILITY FOR REPLACE"
990 GOTO 1090
1000 PRINT "Q31-COMPARE TO STD A FATIGUE, RATE TBDU MAINTAINABILITY FOR SNAG"
1010 GOTO 1090
1020 PRINT "Q32-COMPARE TO STD A FATIGUE, RATE TBDU MAINTAINABILITY FOR TEAR"
1030 GOTO 1090
1040 PRINT "Q33-COMPARE TO STD A FATIGUE, RATE TBDU MAINTAINABILITY FOR RIP"
```

Appendix A (cont)

```
110 IF P=7 THEN 520
120 IF P=8 THEN 540
130 IF P=9 THEN 560
140 IF P=10 THEN 580
150 IF P=11 THEN 600
160 IF P=12 THEN 620
170 IF P=13 THEN 640
180 IF P=14 THEN 660
190 IF P=15 THEN 680
200 IF P=16 THEN 700
210 IF P=17 THEN 720
220 IF P=18 THEN 740
230 IF P=19 THEN 760
240 IF P=20 THEN 780
250 IF P=21 THEN 800
260 IF P=22 THEN 820
270 IF P=23 THEN 840
280 IF P=24 THEN 860
290 IF P=25 THEN 880
300 IF P=26 THEN 900
310 IF P=27 THEN 920
320 IF P=28 THEN 940
330 IF P=29 THEN 960
340 IF P=30 THEN 980
350 IF P=31 THEN 1000
360 IF P=32 THEN 1020
370 IF P=33 THEN 1040
380 IF P=34 THEN 1060
390 IF P=35 THEN 1080
400 PRINT "Q#1  COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR SITTING"
410 GOTO 1090
420 PRINT "Q#2 COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR STANDING"
430 GOTO 1090
440 PRINT "Q#3 COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR WALKING"
450 GOTO 1090
460 PRINT "Q#4 COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR RUNNING"
470 GOTO 1090
480 PRINT "Q#5 COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR BENDING"
490 GOTO 1090
500 PRINT "Q#6 COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR REACHING"
510 GOTO 1090
520 PRINT "Q#7 COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR CLIMBING"
530 GOTO 1090
540 PRINT "Q#8 COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR DRESSING"
550 GOTO 1090
560 PRINT "Q#9 COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR UNDRESSING"
570 GOTO 1090
580 PRINT "Q#10 COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR ADJUSTING"
590 GOTO 1090
600 PRINT "Q#11 COMPARED TO STD A FATIGUE,RATE TBDU COMFORT FOR LEG FREEDOM"
```

APPENDIX A. AQAAS PROGRAM FOR TEMPERATE BATTLEDRESS UNIFORM

```
10 PLM PROGRAM USED FOR THE AUTOMATED QUESTIONNAIRE ANALYSIS SYSTEM(AQAS)
11 REM AND IS STORED IN FILE #6 OF TAPE MARKED AS AUTOMATED QUESTIONNAIRE
20 REM ANALYSIS SYSTEM(AQAS)
30 REM AUTHORS: HARDWARE= L HAY   SOFTWARE= R AVENDANO        2 JUNE 1981
40 REM PROGRAM ACCESSES INPUTS FROM (N) NUMBER OF TPS AFTER RESPONSE TO
50 REM QUESTIONNAIRE ARE SET ON CONTROL BOXES.
60 REM ANALYSES AND PRINTOUT PROVIDED ARE:
70 REM      A. DATA LISTING PER SUBJECT (N)
80 REM      B. MEAN,STANDARD DEVIATION,SKEWNESS,KURTOSIS,XMIN,XMAX,RANGE
90 REM      C. HISTOGRAM WITH FREQ.  DISTRIBUTION PLOT
100 REM     D. CUMULATIVE FREQ. PER CELL.
110 REM EQUIPMENT USED ARE: HP9830A CALCULATOR
120 REM                     HP3495 SCANNER(082)
130 REM                     HP5300B MEASURING SYSTEM(830)
140 REM                     HP5312A HP-IB INTERFACE(830)
150 REM                     HP5306A MULTIMITER/COUNTER(828)
160 REM                     (N) NUMBER OF CONTROL BOXES DESIGNED
170 REM                     AND CONSTRUCTED IN HFL
175 REM-------------------------------------------------------------------
200 DIM AI[50],U[1,40],G[40],H[40]
210 FOR I=1 TO 50
220 A[I]=0
230 NEXT I
320 S1=S2=S3=S4=N=R3=R4=R5=T1=E=0=A=0
330 R1=1E+99
340 R2=-R1
341 S5=1
342 Q=0.5
343 C=1
344 D=1
470 PRINT
480 B=50
520 DISP "PRESS DATA ENTRY KEY";
530 END
```

```
10 S1=S2=S3=S4=N=R3=R4=R5=T1=E=X=G=0
20 E=1
30 DISP "QUESTION #=";
40 INPUT P
50 IF P=1 THEN 400
60 IF P=2 THEN 420
70 IF P=3 THEN 440
80 IF P=4 THEN 460
90 IF P=5 THEN 480
100 IF P=6 THEN 500
```

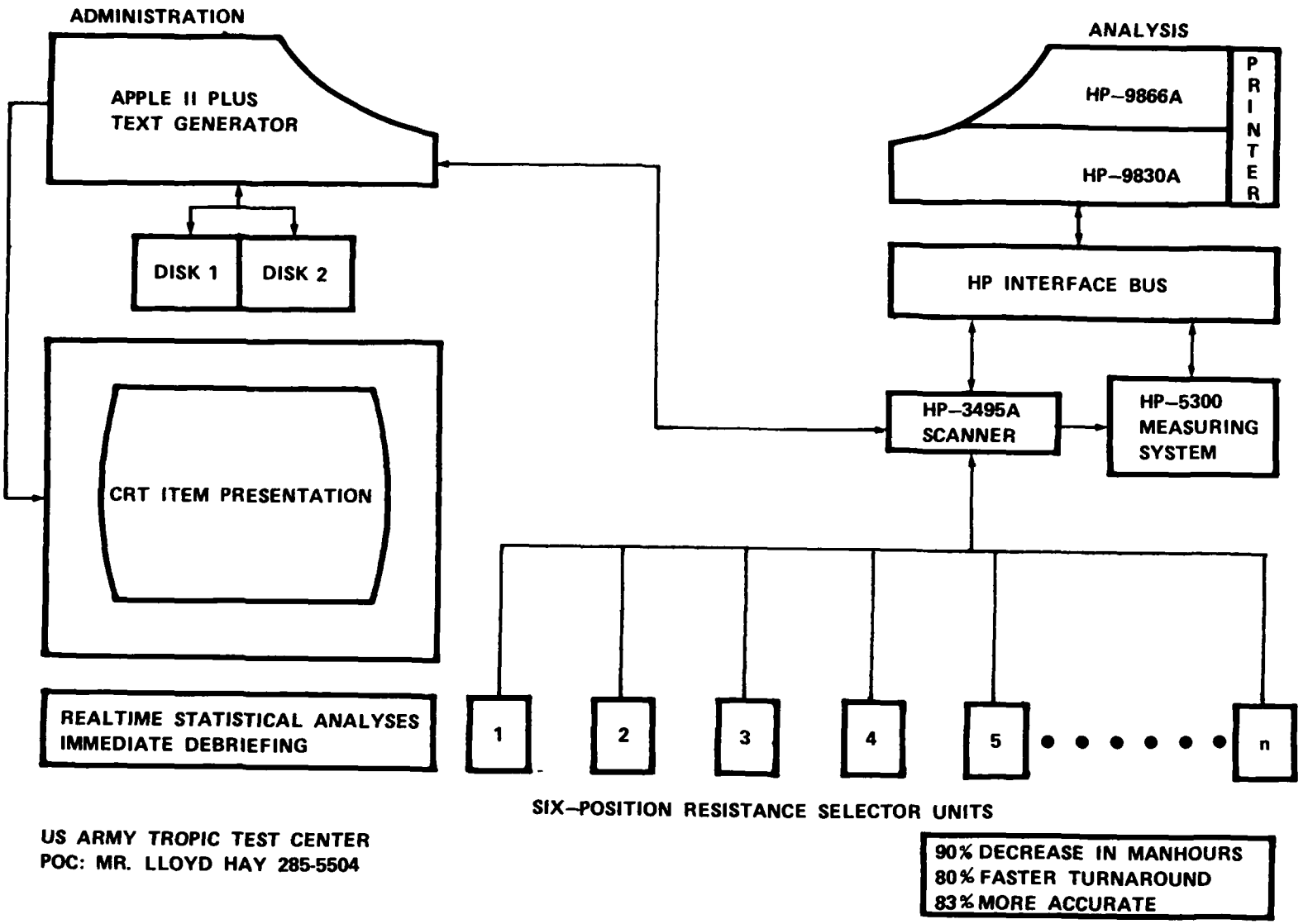

Figure 7. Proposed AQAAS.

CONCLUSION AND DISCUSSION

AQAAS application is not limited to human factors questionnaires. AQAAS can be applied to many types of questionnaire administration and to some types of data acquisition. Minor modifications can be made to yield continuous and discrete data.

Expansion accessories have been acquired for the AQAAS. The slide projector and interface are being replaced by an Apple II Plus microprocessor with two disk drives and IEEE-488 bus. The Apple can be used for text presentation (it has high resolution graphics) and will be interfaced directly to an HP 9845 (replacing the HP 9830A). Figure 7 is a diagram of the proposed system.

ANALYSIS

Significant man-hour savings were associated with using the AQAAS to administer questionnaires and analyze questionnaire data.

(1) Required Man-Hours

Man-hours required to administer and analyze 150 subjective questionnaires using typical techniques and AQAAS are presented in table 1. The data analysis activities for typical techniques made up the majority of required man-hours for the entire procedure (82 percent). Typing and reproduction hours increased from 2 to 4 with AQAAS. This increase represented the time needed to prepare slides. Cutting the required data analysis hours from 78 to 3 reduced data analysis activity by 96 percent. Hours required for the entire procedure were cut by 76 percent (96 to 23 hours).

TABLE 1. MAN-HOUR BREAKDOWN

Variable	Required Man-Hours			
	Typical Techniques		AQAAS	
	Hours	%	Hours	%
Questionnaire Preparation	8	8	8	35
Typing and Reproduction	2	2	4	17
Administration	4	4	4	17
Data Analyses	78	82	3	14
Write-up	4	4	4	17
Total Hours	96	100	23	100

(2) Test Validity

AQAAS provides a unique opportunity to summarize data instantly and to ask questions when a significant proportion of respondents indicate that there is some problem connected with a question. The critical proportion could be based either on an average rating (items rated, on the average, 2.0 or lower on a six point scale), on a frequency of rating (30 percent or more of the test participants rate the item at the unsatisfactory end of the scale), or on a proportional scheme (rank order the individual items in terms of average ratings and select the lowest 10 percent).

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STETC-MTD-P	2
STETC-MTD-O (TIC)	5
STETC-MTD-O (Tech Ed)	2
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